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OLD AND NEW STYLE
FIXED DATES CALENDARS

AND THE
PRINCIPLES AND RESULTS OF EMENDATIONS

A PAPER

READ BEFORE THE SOCIETY FEBRUARY 3^d 1881

BY
JOHN R BAKER



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It should be borne in mind that the aim of these pages was merely to strengthen views maintained in oral discussions presenting many sides. To meet conclusively the different classes of objectors on their own grounds, a considerable expansion was unavoidable, mainly of a popular character, though sometimes dependent on astronomical facts as given by the best authorities.

OLD AND NEW STYLE.

IF your honorable body will accept a volunteer in the room of the essayist appointed for this evening, the courtesy, possibly opening the door to an infliction, may save—under patient endurance—from error—at least from confusion in the settlement of dates.

This paper originates in the request of an old friend and brother alumnus of the University of Pennsylvania, Mr. Lewis Allaire Scott, whose investigations have already enlightened you on the subject of "Fixed Anniversaries," having for objective the proper date in 1882 whereon should be celebrated the bi-centennial of William Penn's first landing in Pennsylvania at Upland; the historical date of which is here assumed to be correct, Sunday, Oct. 29, 1682.

There has been presented a printed pamphlet* comprising the definition of an anniversary with four methods of procedure to convert the same from one system of chronology into another, within prescribed and supposed necessary limits. The author, entirely faithful to the terms of the proposition, "claims the right of judgment in the apparently varying practice without being open to the charge of carelessness or error;" the Act of Parliament, and Bull of Gregory appended, are not only convenient references, but absolute laws regulating the calendar, and the whole accepted by you, while open to no criticism, may yet be used in further seeking after truth. There are related ideas of value thrown out which are not fully appreciated, since the

Act and Bull,
pp. 1-5.

* The pamphlet entitled "Act and Bull," printed by the Society, considered another date, that of Penn's presumed landing in Philadelphia, Nov. 8, 1682.

whole subject seems to be pushed aside; your minds meantime, persistent in the first line of thought, not well examined, are creating for themselves a necessity that does not really exist. Bear, then, with a review of the case, possibly tedious, but of some worth if it should prevent notions from crystallizing round complexity when a natural and simple form is quite as attractive as it should be imperative. It will be profitable to call from the back shed of memory old, familiar, but long unused lore.

The question treated by the author of "Act and Bull" embodies views to which some, perhaps a majority of those now present, may still adhere. These views seem to involve—

First. THAT A CALENDAR IS AN EXACT METHOD OF COMPUTING TIME.

Second. THAT AN ANNIVERSARY SHOULD BE AS ITS ETYMOLOGY—AN ABSOLUTE YEARLY RECURRENCE OF ANY EVENT.

Third. THAT A CHANGE IN THE METHOD OF COMPUTING TIME, OR CALENDAR, CREATES A NECESSITY FOR CHANGING THE ANNIVERSARY FROM OLD STYLE INTO NEW.

FIRST. WHAT IS A CALENDAR?

A calendar is a register of the months, days, times, and seasons of the year, and of remarkable events in the past—a convenient manual, almanac, or systematic table for reckoning time. Its great scope consists in presenting in a definite number of days the relatively indefinite period of the earth's translation round the sun, viz., 365 days, 5 hours, 48 minutes, 46.05 seconds, or mean solar year.

Among the nations of the earth widely different reckonings of time have been employed. The early Egyptian counted 360 days to the year, adding in five supplementary days at the end; some astrologers of Thebes discovered, however, that about six hours more were required to make the year return to the first point of observation—the rising of Sothis or Sirius. This system lost a day

every four years; with this addition the amended one or Sothic year of $365\frac{1}{4}$ days fell short of the sidereal year on which it was based some 9 min. 6 sec. annually. The early Greek calendar was on a computation of months; twelve lunations in their year made the number of days annually too short. Meton, B.C. 432, corrected the calendar and changed the time of the commencement of the year from the winter to the summer solstice. The Olympiads, first noted about B.C. 1453, were irregularly observed till B.C. 776, when the games were re-instituted and constantly celebrated; from this epoch computations of time were made, the Olympiads being the periods between the celebration of the games—four full years. On the fifth, at the full moon next after the summer solstice, the games were renewed for five days, but as the moon might be *just after* the solstice or *four weeks* removed, the intervals of the Olympiads were unequal in length, making the eras, if continuous, irregular. The reckoning by this method continued till the fourth or fifth century Anno Domini, being employed by many neighboring nations.

The Jewish year, the earliest one, was like the two referred to, a rude reckoning of 360 days; all the ancient computations, taking rise, probably, in a remote practice between Noah's flood and the Dispersion. After the Exodus, a year essentially solar was adopted, but its months were lunar; twelve months in the year and an intercalary one when necessary. In later times the Jews are erroneously credited with having *two* years: they really had two commencements of the year: one, sacred, beginning at or near the vernal equinox; the other, civil, at or near the autumnal equinox.

Descend now the stream of time to the fourth year of the fifth Olympiad, about B. C. 753, when the building of Rome claims attention; an epoch historically uncertain as to true date, but from which springs an era "Anno Urbis Conditæ," the first regular method of computing time, very little better than the systems antecedent. All are inexact, though, for the people using them, fairly serviceable. The most skilful star-gazers without nice instruments for observa-

tion can only give approximate results, and the most eminent chronologists of all nations are hopelessly perplexed when they would fix exact dates by any or all of these calendars. The most that can be done by them is to come *as near as possible* to the year date, adding the word of uncertainty “circum,” *about*.

About A. U. C. 707 (B. C. 46), Julius Cæsar found great confusion in the calendar. The civil year differed from the tropical some three months. The year was lunar with considerable alterations grafted on it, from the time of Romulus; many of these were arbitrary and corrupt. It would appear that there was no high science in Rome just then, so the Emperor took into counsel an Egyptian mathematician, Sosigenes, of Alexandria, with whose aid the lunar year was abolished, and a Sothic year of $365\frac{1}{4}$ days established, having its beginning changed from March 1st to January 1st. To correct the civil year Julius decreed that the year A. U. C. 708 should have eighty, some say ninety, days added in between October and the *second* thirty-first of December thence following. The intercalary day was given to February, “bis-sexto Kalendas Martii;” the months were made to add up 365 days for three common years, and 366 days for the fourth. The arrangement of the days in the several months, as at present, was made by Augustus, with some other modifications. The amended year was in excess of the true solar year eleven minutes and fourteen seconds (11' 14'') nearly, whereby the vernal equinox fell back in every century about three-fourths of a day. When Julius lived the vernal equinox was on March 25; in A. D. 1600, it had receded to the 11th, a difference of 14 days. Gregory XIII. desiring that the vernal equinox should be hereafter *always* on the date on which it fell in A. D. 325 (Council of Nice), viz., 21st of March, the difference is the famous *ten days*, hereafter to be treated of.

Observe that this retrogression of the vernal equinox is due to the *calendar system* described above, and to it solely. Every cen-

tury was a day too long by the *reckoning*, which is the same as saying the count by days was in advance of the sun's arrival in his course, apparently considered. The precession of the equinoxes, that phenomenon which causes the earth to come to equinox a little before it has completed a full translation round the sun—real motion—has nothing whatever to do with the *calendar* variation. The mean solar year remains constant. The equinoctial points moving on the ecliptic in the contrary order of the signs, 50 seconds of arc annually, shortens the interval of observation only, not the circuit the earth must travel, which, for all methods used by astronomers in measuring the year, must be *exactly the same path*. The allowance made may be shown as follows:—

	Days.	Hrs.	Min.	Sec.
The exact measure of the revolution round the sun is the sidereal year, being .	365	6	9	5.95
The mean solar year is	365	5	48	46.05
Difference is precession			20	19.90

which means irregularity in the earth's motion, too complex to be pursued further here.

Before the invention of the telescope, many observers had arrived within a few seconds at the length of the mean solar year.

Up to this point it needs no argument to show there could have been no fair and fixed recurrence of dates. Passing by the older calendars so confused that the most laborious mathematical skill scarcely can establish in them even the year of historical occurrence; leaving behind the era from Rome built, interjected with corruptions and subterfuges as Pontifex Maximus might dictate; the Julian Calendar appears to possess some claims to accuracy. True, there are the eighty days added in (a convenient little fund wherewith to offset the Gregorian ten!!); the leap years, every centurial year invading and swelling the next and the next with calendar days not equalized by astronomical fact; still the system as a whole

was about as convenient as that now in use to note and celebrate events within the century; outside of this term, exactness was not assured.

CHANGE OF STYLE.

With all the power and authority of his holy office, Pope Gregory XIII. undertook and accomplished a reformation of the calendar for all purposes, mostly ecclesiastical.

Act and Bull,
pp. 6-20.

The objects to be gained by this change are of consequence.

SEC. 6. "Three things necessary:"—

Act and Bull,
pp. 20-21.

First. A fixed place for the vernal equinox.

Next. A correct position for the first full moon which either happens upon the very day of the equinox, or follows next after it.

Finally. Every first Sunday which follows on the same full moon.

After providing for these, "a mode and reckoning should be furnished by which care is taken that for the future the equinoctial and the Paschal moon *shall never be moved from their proper seats.*"

SEC. 7. Provides that ten days shall be dropped from the 5th to the 15th of October, 1582, calling the 5th the 15th, and after arranging the feasts naturally falling on these lost days, directs that the remaining feast days shall be observed successively *as set forth* in the calendar.

SEC. 8. Provides against injury happening to any one, and makes it the duty of judges to add ten other days at the end of any guarantee, on account of this subtraction.

SEC. 9. Provides that the intercalary shall be continued as is customary in every fourth year except in centurial years, decree-

ing that in every 400 years three centurial years shall pass without the bissextus, and that 1600 should be bissextile.

The working of this reform was like that of the Julian year then superseded, in this, that the odd 5 hours 48 minutes and 46.5 seconds, called briefly in practice one-quarter of a day—making up in four years the intercalary of February—really fell short of practice 11 minutes 14 seconds annually. The year is not equal to 365 days 6 hours by this fraction of time, which accumulating for a century amounts to three-quarters of a day; more correctly speaking, one day in 128 years. A day dropped out of the old reckoning or rather the omission of the intercalary in three out of four centurial years, a sort of quadro-centesimal leap year system, makes up a close but not exact compensation at the close of centuries.

The first requisite of the Papal decree, "That the vernal equinox should have a fixed place and should never be moved from its proper seat," was approximated but not accomplished fully, as astronomers will testify. This "fixed" recurrence shifts along for three years to be corrected partially on the fourth; the overplus* carried through three centurial years to be righted on the fourth, with still another fragment of time over, which will be happily and satisfactorily accounted for in about 3300 years.

Now what was the amount the Holy Father at Tusculum paid back to Old Father Time?—At the rate of 20 hours in a century—12 minutes in a year!!

What is the apparent loss to the three centuries following, from the 16th to the 19th? At the rate of 3 days 16 hours per century, 53 minutes per year!!

* The last four years of the Julian century required an intercalary of 1 day.

But the century so reckoned had lost

$\frac{3}{4}$ "

There was an overplus due the century

$\frac{1}{4}$ "

Or in four centuries one day.

Prof. Simon Newcomb questions the wisdom of the Gregorian change, thinking it difficult to show what practical object is to be attained by seeking exact coincidence of the calendar and astronomical year. He considers that "the popular opposition to change of calendar indicated that the common sense of the people was more nearly right than the wisdom of the learned."

He further intimates that the question of making 1900 a leap year will no doubt be discussed as the end of the century approaches, and possibly some concerted action be taken by leading nations to a return to the old mode of reckoning, but the common sense of the people as aforesaid, will again be as opposed to the step backward from the present system as it was to the forward advance toward it. The nineteenth century surely will not go back on itself.

Nearly exact coincidences of calendar and year are to be found in the Persian system, which in the course of thirty-three years makes eight intercalations: the quadrennium, as hitherto, being repeated seven times, then four common years and the fifth made a leap year. Its changes are more frequent in the century and hardly as convenient, neither is it in use among Christian nations.

It has been dwelt on that the Papal Bull did not disturb fixed religious days from their old positions in the calendar; that these constitute a large array of instances, most of them anniversaries; with remarks on the analogy of these fixed days as controlling decisions of the "case considered."

Act and Bull,
pp. 6, 7, 8.

It is claimed that Christmas is a *date*. St. Chrysostom says that Julius I. in the fourth century, at the solicitation of St. Cyril of Jerusalem, caused strict inquiries to be made, and, following what seemed to be the best authenticated tradition, settled authoritatively the 25th December.

The birth of John the Baptist is a date.

The day of Martyrdom is a date.

The celebration of the day of the reformation in Germany October 31, 1517, of the presentation of the confession of faith to the Emperor Charles V. at Augsburg June 25, 1530, of the adoption by Protestant Germany of the Book of Concord June 25, 1580, have been cited; all natural dates and repeatedly used without change of style.

Excepting in countries under the Greek Church the change of calendar in every nation in Christendom was the same in basis.

As far as a system of divergences and compensations could effect it, the vernal equinox was made immovable, and Easter and the Paschal full moon settled.*

Italy, France, Spain, and Portugal made the change in 1582—Catholic Switzerland, Germany, and Netherlands in 1582; Poland in 1585—Hungary in 1587—Protestant Germany, Holland, and Denmark in 1700. England in 1752—Sweden in 1753.

In all the calendars excepting those of the last two, the punctum immobile had been settled at March 21. In the last two the corresponding day was March 9 or 10, with errors increasing.

Act and Bull,
p. 12.

In all, the year 1600 was a leap year; in those only of Britain and Sweden 1700 stood a leap year. The year of the Act of Parliament was a leap year bearing the burden of its three predecessors and amending the quadrennium as far as it might do. In the following year the calendars of all Christendom showed the same 21 March fixed in the same place, not absolutely, but by the agreement of all concerned, whatever might be the year of the recognition and adoption of the principle; the tardiness of a century and a half makes nothing in the question, the point d'appui was the very same.

* Here occurs a discrepancy between practice and astronomy. The Paschal Moon is *by agreement*, and may come to the full a day or two before the mean astronomical moon, or after it.

The establishment of this date-point is the basis of the practice governing the change from Old Style to New in all cases where such conversion is required, or where a date in the earlier system calls in the name of justice for recognition and establishment in the later. Beyond the point named, corrections apply to solstices, time-covenants, annuities, rents, leases, minorities and such like, all carefully specified —*and to these only.*

Act and Bull,
Appendix.

It was the original intent of this paper to throw light on the four methods of practice already presented to you without going further. The question seems simple, the figures few, but the confusion of mind great, since a simple date in Old Style branches out into four of New Style with apparently good reasons, as there are earnest advocates for each. The difficulty is to counteract the misapprehensions of all classes of candid reasoners on the subject; to restore simplicity to a thing sufficiently simple were its surroundings always kept in view: to do all this has given rise to much thought and many calculations whereby to test results in more ways than one.

Look now at the treatment of the vernal equinox.

The correction in Italy was made as stated in 1582 the advantage sought did not appear till 1583; the change then was in effect to push forward the equinoctial point (dropping *days* but adding the sum of *dates* dropped) from March 11 Julian, by the addition of ten days, to Gregorian March 21. In England the correction of 1752, in like manner, pushed forward the equinoctial point from March 10, as settled by the Act, by the like process, and made, by addition of eleven days in the calendar of 1753, the Parliament March 21. In all the calendars 1600 was a leap year, in England 1700 was a leap year; had it been kept as a common year its Feb. 29 would have been March

Act and Bull,
p. 12.

1, and March 10th the 11th ; the equinox had thus receded one day more ; the Act virtually corrects this by adding 11 days to the 10th, or March 21.* This one day's recession affects every conversion of date. The sun's apparent place fell back by the intercalary of 1700 one day *more* than the Gregorian ten days.

Turn now to Method No. 2.

Vernal equinox,	1582,	March 11,	O. S.	
call it by New S.	1582,	"	21,	N. S.
recurrence,	1882,	"	21,	"

Act and Bull,
p. 2.

But then 1700 and 1800 must each drop the intercalary ; if kept Julian Style, the 21st will be March 20, 1782, and March 19, 1882, one day in a century.

By this test examine the recurrence of Penn's landing in Method No. 2, which makes the date† Nov. 8, N. S., which is correct, provided the amendment was *complete* in 1682. The centuries over which this date is assumed to pass would each have dropped a day. The calendar date would agree with the sun, and be kept so to furnish correct centennial recurrences for many ages, Nov. 8. The fact is, that the correction of the English calendar did not take place till 1752, when the centurial intercalary had disturbed the relations between date and sun ; one day more must be dropped out and one date added ; thus the Nov. 8 of No. 2 becomes Nov. 9 in the corrected English calendar.

Method No. 3 needs no comment ; it is that of the Act, correctly harmonizing with the foregoing : Oct. 29, add 11 days—Nov. 9.

* Appearing first in calendar of 1753.

† Penn's landing, 1682, say Oct. 29, O. S.

Call it by New Style, 1682, " Nov. 8, N. S.

Anniversary, 1882, " Nov. 8, N. S.

Method No. 4 is wholly in error.

1682, March 11, Old Style, carried to its recurrence in 1882, would be pushed back to March 9, the sun's place and true date; requiring 12 days to make the equinox correct.

Oct. 29, 1682, carried to 1882, must go back two days for agreement of calendar and sun: thus, Oct. 27. But in 1752 there was one day already dropped, and date counted up, which converts Oct. 27 to Oct. 28, add twelve days, Nov. 9, one day for each century to the ten Gregorian.

1700 1.		Method No. 4 may be carried fairly to A. D. 2003.	
1800 1.		Penn's landing,	1682, say Oct. 29, O. S.
1900 1.		Old Style recurrence, 2003,	" 29, O. S.
2001 1.		Call it by New Style, 2003,	Nov. 14, N. S.
2002 1.		or the absurd reduction.	
2003 1.			

At this rate of progression, should life and intention be prolonged, the good man's day might be made Christmas, New Year, or the Fourth of July, a blessed mixture of dates for posterity.

The learned President has suggested that a ready mode of reckoning the bi-centennial of Penn's landing (under the preconceived idea of the necessity of changing styles) might be found by counting up the number of days in two centuries:—

Oct. 29, 1682, to Oct. 29, 1782, O. S. contains 36,525 days.

Error by Gregorian decree, 12 centuries, 10 days.

Error by Act regulating 1700, 1 day.
 ————— drop 11 days.

In the century of *correction* there were 36,514 days.

In the century *corrected* and following, 36,524 "

Bringing these two centuries to 1882, New Style, —————
 they contain 73,038 days.

From this sum deduce the average year in two centuries, 365 days, 4 hours, 33 minutes, 36 seconds, which is short of the mean solar year nearly 11 days, without calculating fractions. If, then, you will add to Oct. 29 this 11 days, you find Nov. 9, and continued so in a corrected calendar.

SECOND. WHAT IS AN ANNIVERSARY?

A yearly return of a memorable day—any day kept which one may choose to consider remarkable. Act and Bull,
pp. 3, 8.
Under the preceding head a periphrasis was used, namely, recurrence of date, meaning in the argument the same thing, but avoiding a word yet to be considered. At the present day, this word connects in idea with celebration—of memory of the past; its weight and influence; a promise, a ring, a special blessing, a grievous woe, a very trifle, somehow associated with a date or time of year. Occurrences affecting nations or communities follow the same principle.

If an anniversary be taken by calendar, the point of precision is lost, while the makeshift of coming as near it as possible, virtually yields the question of “fixed and true anniversaries” which evoked this discussion. Calendar anniversaries in their nature are by agreement; by agreement often and often the weight of the event falls on another day or time altogether; thus the 4th of July once in seven years is observed on the 5th; the sesqui-centennial of Baltimore was made to occur at any convenient time in October, 1880.

A child born January 1, 1880, has by agreement its first birthday January 1, 1881; its little life, watched by hours, days, weeks, and months, has really counted one year, eighteen hours.

Rossini, the composer, was born February 29, 1792, his first

birthday must have been March 1, 1793, by agreement, when he was one year one day old.*

Considering the difficulty of adapting to a definite manual, the rather indefinite term of the earth's translation round the sun, the divergences and compensations, annual, quadrennial, centennial, and ter-millenary, necessary to the correctness of this most complete calendar ever used by enlightened people, is it wise, is it philosophical to change a natural, easy, and harmonious date for the sake of less than an average hour of time per annum, while far greater allowances are made in the same period and pass without note or comment?

THIRD. IS THERE ANY NECESSITY FOR A CHANGE OF STYLE?

None whatever, if you are satisfied; if the principles as set forth are maintained fairly, and the explanations correct; Penn's landing was a historical event, the anniversary of which should fol-

low the examples already given, being in character
 Act and Bull, p. 5. the same with the "sound analogy" before you.

Many more might be given, some of recent occurrence; *e. g.*, Tom Paine, January 29, 1736, celebrated in New York, January 29, 1881; but perhaps those referred to (pp. 10, 11) will suffice. If, then, you accept the date now considered to be October 29, 1682, make the bi-centennial anniversary the *natural date*, by declaring unmistakably that it is and of right ought to be October 29, 1882.

* Another little instance will doubtless be called to mind of a young man born on the 29th of February, who was apprenticed to a pirate under indenture of service, not till he should arrive at the age of twenty-one years, but *till his twenty-first birthday*; a most ingenious paradox! This term, extended out to 84 years, created, when published, no small surprise in *many high circles*, while a large number of sympathizing people *sought relief in tiers!*

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